THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

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Gill and Eisenman Attend M.S.M.-St. Louis Joint Meeting

Seated at the Executive Table at the Joint Meeting of the St. Louis Chapter and the Missouri School of Mines Group Are, Left to Right (Facing Forward): Herbert Kamper and Jack Markley, Vice-Chairman and Chairman Respectively of the Missouri School of Mines Group; National Secretary W. H. Eisenman; Prof. C. Y. Clayton of Missouri School of Mines; President James P. Gill; Prof. D. F. Walsh; and Carl Morken and C. W. Schemm, Chairman and Vice-Chairman Respectively of the St. Louis Chapter. (Photo by William J. Harris, Jr.)

Student Group at Rolla Is Host to St. Louis Men For Afternoon Program

By Charles Y. Clayton

The Missouri School of Mines and Metallurgy Group played host to the St. Louis Chapter in a joint meeting at Rolla, Mo., on April 19.

The program started at 11:00 in the morning, with President James P. Gill's talk on tool steels.

At 3:30 p.m. the group again assembled in the auditorium of Parker Hall. Y. J. Bruce, contact metallurgist, Jones & Laughlin Steel Co., spoke on "Some Aspects of the Mechanics of Cold Finishing Steel".

This was followed by a color film of the bessemer process, and D. F. Walsh, assistant professor of metallurgy at Missouri School of Mines, concluded the afternoon program with a talk on "Mechanical Tests as Applied to Metals and Alloys".

At 6:15 a dinner was held at Hotel Edwin Long. Professor Walsh acted as toastmaster. Speakers were Carl Morken, Carondelet Foundry, St. Louis chairman; J. P. Gill and W. H. Eisenman from headquarters; Jack Markley, chairman M.S.M. Group; and Charles Y. Clayton, professor of metallurgical engineering and ore dressing, Missouri School of Mines.

The St. Louis Chapter extended to the student organization an invitation to meet in joint session in St. Louis during the coming year.

The local committee in charge of arrangements was made up of Jack Markley, Alexander Rubin and Tom Kelly.

National Metal Congress & Exposition
Cleveland, Oct. 21 to 25, 1940

Ernst Speaks at Milwaukee

By W. J. Resiner

Milwaukee Chapter turned out with the largest crowd in its history to hear about "Researches in Metal Cutting" by Hans Ernst, research director of the Cincinnati Milling Machine Co.

Mr. Ernst explained the theory of chip formation in metal cutting and his excellent moving pictures of the actual cutting edge were proof enough of these theories.

In a short meeting preceding the talk, officers were elected for the 1940-41 season. Their names will be published in a later issue.

New A.S.M. Officers Are Nominated

In accordance with the Constitution of the American Society for Metals, the Nominating Committee appointed by President James P. Gill met on Wednesday, May 22, in New York City.

The Nominating Committee consists of Charles H. Herty, Jr., Chairman; H. H. Lester, Adam M. Steever, William H. Swanger, W. H. Phillips, L. E. Raymond, and C. B. Swander.

The following nominations have been made:

President (1 year)—Oscar E. Harder, assistant director, Battelle Memorial Institute, Columbus, Ohio.

Vice-President (1 year)—Bradley Stoughton, consulting engineer, Lehigh University, Bethlehem, Pa.

Secretary (2 years)—William H. Eisenman, 7301 Euclid Ave., Cleveland, Ohio.

Trustees (2 years)—Charles Y. Clayton, professor of metallurgical engineering, Missouri School of Mines, Rolla, Mo., and E. L. Bartholomew, metallurgist, United Shoe Machinery Corp., Beverly, Mass.

Sudbury Nickel Deposits Were Originally A Source of Copper, Montreal Is Told

By Eric Crawford

Montreal Chapter — "Production of Copper and By-Products Metals From Sudbury District Nickel Deposits" was the title of the paper given before the March meeting by R. H. Waddington, of the Copper Refining Division, International Nickel Co.

The talk was preceded by two motion pictures, "Excursions in Science", by courtesy of Canadian General Electric Co., Ltd., and "Operations at Ontario Refining Co., Ltd.", the latter a pictorial summary of many of the operations described in the paper.

The history of the Sudbury deposits dates from 1883. Originally a copper deposit, the nickel was considered as an impurity most difficult to deal with.

With the discovery of the Orford process, making the separation of the two metals economical, nickel became the chief product, and copper incidental. Proper balance of the market has now been accomplished so that both metals have their places.

Crushing, grinding and flotation separate the copper-nickel sulphides from the rock. The copper concentrate is taken from the reverberatory furnaces to converters and blown down to blister copper. The formerly troublesome nickel-copper remainder is roasted in another circuit, remelted and cooled in the presence of sodium sulphide, the basis for the Orford process.

In the molten state, copper sulphide is more soluble in sodium sulphide than is nickel sulphide, and the two compounds separate in strata when cooled in pots. Mechanical separation is easily effected by breaking the ingot apart.

The nickel concentrate goes to Port Colborne refinery, and the copper re-

(Continued on Page 3)

Compliments

To **Andrew McCance**, director and general manager of Messrs. Colvilles, Ltd., Glasgow, Scotland, on award of the Bessemer Gold Medal at the annual general meeting of the British Iron and Steel Institute on May 2.

To **Erle Ross**, engineering editor of *Steel*, on his election as president of the Indiana Club of Cleveland.

To **Springfield Chapter** and its chairman, **B. G. Constantine**, on the completion of the most successful and prosperous year in its history, with a record of over 100 members, including 18 sustaining.

To **Sir H. C. H. Carpenter**, professor of the Imperial College of Science and Technology, London, on his election as medalist of the Japan Institute of Metals for 1940. Also to **Prof. Kotaro Honda**, honorary member of the A.S.M., president of the Institute and also of Tohoku Imperial University, in whose honor the medal and monetary prize were originated and dedicated last year.

Birmingham Is Center of New Southern Group

Organized April 18, 'Baby' Chapter Signs up 80 Members

On Thursday evening, April 18, the organization meeting of the new Southern Group of the American Society for Metals was held at the Tutwiler Hotel in Birmingham, Ala.

In response to a growing demand for an A.S.M. Chapter in this major metal-producing district, 62 signatures were secured on the petition for a charter presented to the Board of Trustees of the Society and granted at its meeting of April 12. The Group now has about 80 members signed up.

The following officers were nominated at the organization meeting and elected by letter ballot of the membership:

Chairman—James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

Vice-Chairman—John H. Beeler, Crucible Steel Co. of America, Birmingham.

Secretary—Robert S. Crowder, Tennessee Coal, Iron and R. R. Co., Birmingham.

Treasurer—Thomas C. Ford, Electro Metallurgical Co., Birmingham.

The executive committee has also been elected and various standing committee chairmen appointed.

The first regular meeting of the new Group will be held May 28 in Birmingham with past A.S.M. President E. C. Bain of U. S. Steel Corp. as speaker on the topic of "Functions of the Alloying Elements in Steel".

York Holds Ladies Night With Dancing, Novel Show

By A. Floyd Whalen

York Chapter held its seventh annual ladies night on Thursday evening, April 4, at Crosskey's Night Club—a spot easily within sound of the guns of Gettysburg.

A record attendance sat down to a turkey dinner at 7:30 p.m. in the beautiful saffron dining-room. As most of the ladies had met, everyone felt quite at home, as manifested by spontaneous singing. Old songs and new rolled out without coaxing and climaxed in "Roll Out the Barrel" when the proprietor offered a round of drinks on the house.

After the supper came an entertainment furnished by York's friends, which included novelty dances by Rita O'Neill, daughter of George O'Neill, former Chapter chairman, squeeze box selections by Reba M. Crumling, and songs by Margaret Jones Schroeder, who acted as mistress of ceremonies.

Prize dancing followed for all present and at 11:00 p.m. the first floor show was put on. It was so good that many stayed for the second performance at 12:30 a.m.

Only one casualty was reported—the case of E. J. Strong, whose soup reached the outside of his stomach instead of the inside, he and one of the waitresses having got their signals crossed.

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OSCAR E. HARDER, *Vice-President*
W. H. EISENMAN, *Secretary*
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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Lecture on Heat Treating Covers Age Hardening, S-Curves

By John W. McBean

Ontario Chapter — For the April meeting a talk on "Heat Treatment of Metals" by one of our own members, R. C. Stewart of Pratt & Whitney Co. of Canada, proved very popular. Mr. Stewart's aim was to give a clear picture in popular language of what takes place in heat treatment, rather than a scientific discussion.

Age hardening alloys such as duralumin and beryllium copper were briefly discussed, and it was pointed out that in many instances the addition of a third element to a non-aging system will often render it heat treatable. For example, the addition of 0.5% aluminum to Monel metal (70% Ni, 30% Cu) converts it into a hardenable alloy.

From examination of S curves of a 0.9% carbon steel it is seen that the temperature drop past the nose of the curve (in the vicinity of 1000° F.) has to be very rapid, and it is therefore not possible to quench a very large section free from a soft core, although the outer shell will be hard martensite.

By using alloys which retard transformation it is possible to harden more deeply, or with a less drastic quench. French gives the following values for critical cooling rates: For 0.8% carbon steel 290° per sec.; for 0.8% carbon plus 3% nickel, only 32° per sec.

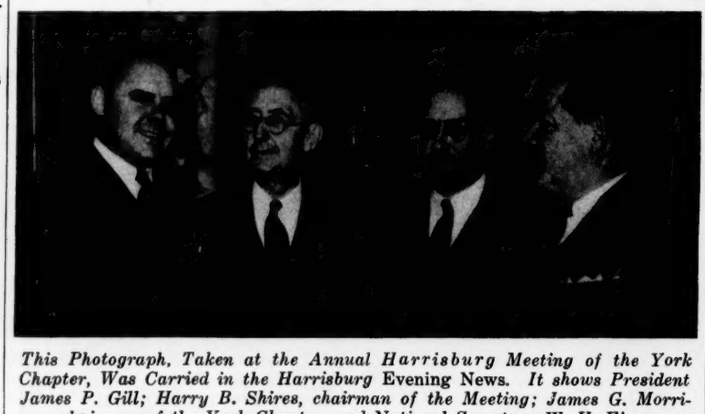
Various types of furnaces and their atmospheres were briefly discussed, as were quenching media. In brines the effect of salt on the solubility of gases was illustrated by adding salt to a glass of carbonated water, when a great volume of gas was suddenly released.

For quenching high speed steel peanut oil is very good, but lead quenching is recommended to minimize hot upsetting troubles. The importance of allowing high speed to become thoroughly cool prior to tempering was stressed, as was the need for a double draw in the vicinity of 1050° F.

Warping was discussed and how to make use of favorable stresses was brought out. Long, low drawing will smooth out most hot upsetting stresses, but drawing above 400° is necessary to ease stresses caused by formation of martensite.

Oil hardening steels, like high speed, should be allowed to stand long enough to be fully transformed prior to the tempering operation.

York Chapter Has Meeting in Harrisburg



This Photograph, Taken at the Annual Harrisburg Meeting of the York Chapter, Was Carried in the Harrisburg Evening News. *It shows President James P. Gill; Harry B. Shires, chairman of the Meeting; James G. Morrison, chairman of the York Chapter, and National Secretary W. H. Eisenman.*

Gathmann Illustrates Solidification of Ingots

By A. Floyd Whalen

York Chapter honored the town of Harrisburg, Pa., where one meeting is held each year, by inviting the A.S.M. president on April 17.

A dinner crowd of 170 consumed turkey and trimmings at the Wm. Penn Hotel, and increased to at least 200 by the time Emil Gathmann of Gathmann Engineering Co. arose to present his subject of "Ingot Molds".

Mr. Gathmann illustrated the solidification of liquids by means of lead-tin alloy ingots, bleeding the ingots after stated intervals and then sectioning. In making perfect ingots, surface and soundness depend on many factors such as taper and multi tapers, heavy cooling sections for the metal first poured, shape of the mold, size and height in proportion to width, fluted surfaces with small and large fillets, temperature of the molten steel and of the molds, rate of teeming.

At the close of his fine presentation, Bill Faithful and Warner Elsey of the Central Iron and Steel Co. led a very interesting discussion.

President Jim Gill spoke, one moment amusing his audience with his quaint anecdotes and then making all proud of our great organization for what it does and gives to its members.

And subtle Bill Eisenman sold the organization by telling everybody that the A.S.M. is not going after new members since the less the membership the more there is to divide each year with the present members; at present services amounting to $32.50 per member are given each year in return for the $10 in dues.

Testimonial Dinner Honors New Haven Past Chairmen

By S. J. Morgan

New Haven Chapter—A large number of members attended the testimonial dinner at the Hotel Elton, Waterbury, Conn., on April 18 to honor the past chairmen of the Chapter.

After the dinner Chairman Raymond presented certificates in recognition of their services to Past Chairmen H. C. Goodwill, J. S. Gravely, E. L. Wood, C. J. Sauer, W. P. Eddy, Harold Fish, T. H. Chamberlain, H. G. Keshian, F. J. Dawless, S. C. Spalding, M. W. Brewster, R. T. Porter, P. L. Clark, M. J. Radecki, J. F. Sargent, and A. V. Pollard.

After the presentation of certificates the members adjourned to the auditorium of the Connecticut Light & Power Co. and listened to a very interesting talk on "Tools For Hot Working" by H. E. Replogle of the Crucible Steel Co. of America.

Heat Resisting Alloys Fall in Four Areas On Ternary Diagram

By Forrest R. Nagley

Washington Chapter's regular election meeting, held April 8, included as guest speaker G. F. Geiger of the development and research division, International Nickel Co., Inc.

The candidates, as submitted by the Nominating Committee, were unanimously elected by the Chapter, and will be published in a later issue.

Mr. Geiger's talk began with a classification of heat resisting alloys presented on a ternary diagram of the Ni-Cr-Fe System. The classes were grouped about four general areas on the diagram: 80% Ni, 14% Cr; 60% Ni, 15% Cr; 35% Ni, 15% Cr; and 20% Ni, 25% Cr.

He explained that the latter area is not sharply divided and that in the Fe corner of the diagram many popular compositions are found.

The importance of the presence of nickel in excess of 10% was stressed; embrittlement due to prolonged exposures to heat is minimized thereby.

Several lantern slides illustrated various castings intended for high temperature services, including quenching baskets, enameling racks, thermocouple protection tubes, cyanide pots, hot gas manifolds, and variously designed parts of furnaces.

Of the casting techniques discussed, the centrifugal method was the most interesting as indicated by a lively discussion at the close of the meeting. Two particularly interesting applications of heat resisting alloys which were discussed were non-lubricated roller bearings and conveyor parts of continuous heat treating furnaces, and trays for molten lead baths in retorts for the destructive distillation of coal.

During the discussion Mr. Geiger explained certain procedures in casting and commented on particular high temperature services and a particular alloy for each.

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Quality Control Series Continued

By P. E. Nixon

Peoria Chapter—On Monday, April 8, the Chapter held its fifth lecture in a series featuring "Quality Control".

F. G. Anderson, metallurgist, National Lock Co., Rockford, Ill., spoke on "Quality Control of the Manufacture of Automotive and Aircraft Bolts and Nuts". Mr. Anderson used slides to illustrate his talk more clearly.

'Circuit Riders' Visit Detroit; S.R.O. Sign Out

After Talks by Gill-Eisenman Team, Kinzel Simplifies Involved Subject to Delight of Non-Technical Man

By Walter G. Patton

Detroit Chapter—Those greater Chautauqua circuit riders, Gill and Eisenman, visited Detroit on April 8 and, for the second time this season, the S.R.O. signs had to be dusted off. In characteristic fashion, each member of the Gill-Eisenman team pulled out his verbal shootin' iron and blazed away in the general direction of his partner.

As the smoke cleared away, President Gill was heard to mention something highly complimentary about the publications of the Society and its new home in Cleveland.

Society Services Explained

Bill Eisenman then assumed the quite becoming role of a college professor explaining to the class the miracle of a technical society that returns $32.50 worth of services for every $10 invested by a member, sells out its annual metal show without batting an eye and goes about the pleasant business of laying out more floor space.

The meeting was a blue ribbon event in another sense also. Probably for the first time this season the non-technical fellow, who habitually sits in the back of the room and defies the speaker to talk about something in language he can understand, was baffled.

Based on his capacity to simplify an involved subject—namely, the effect of alloying elements in steel—Dr. A. B. Kinzel, chief metallurgist of Union Carbide & Carbon Research Laboratories, deserves top rating.

Dr. Kinzel explained that his talk would be a bird's-eye view; the subject would be intentionally simplified so as to highlight the fundamentals involved and not allow exceptions to the rules to clutter up the subject unnecessarily.

Alloys Improve Ductility

The reason for making most additions of alloying elements to engineering steels, said Dr. Kinzel, is to produce better ductility at a given hardness. The available elements can be divided into the so-called ferrite promoters and austenite (or gamma iron) favoring elements.

By properly balancing additions of these elements it is possible to predict and control, within limits, certain desirable physical properties in steel.

At this point Dr. Kinzel cited the rule of "multiple elements" which, for some unaccountable reason, says that higher physical properties can be obtained by using two elements in combination than by using one element alone. Thus, Cr-Ni, Cr-Mo and Cr-V appear to give better results than any one of these elements used alone.

Steels used in the heat treated condition must again be balanced as to alloy content but here balancing is less insistent than in the case of as-rolled or normalized steels, providing small sections only are to be considered.

In reviewing modern alloy steels, Dr. Kinzel pointed out that while Krupp and Cr-Mo analyses are currently popular, a 3% Cr-Mo steel which has been introduced from England is rapidly gaining in favor. This steel, which can be used in the heat treated condition and may be carburized or nitrided if desired, exhibits a minimum sensitivity to mass effect.

Members of Five Chapters Gather at Penn State for Two Days

Penn State's School of Mineral Industries Was Host to This Group of Over 150 Pennsylvania A.S.M. Members.

Southern Ohio Chapters Gather in All-Day Meeting at Columbus Featuring Quenching

By R. E. Christin

With an all-day program featuring the general topic of quenching, the Annual Tri-Chapter Meeting of the Southern Ohio Chapters—Columbus, Cincinnati, and Dayton—was held in Columbus on Wednesday, April 24.

The program was arranged by Dr. C. H. Lorig, research metallurgist at Battelle Memorial Institute, and also vice-chairman, Columbus Chapter.

The session began with registration of members and guests and an inspection trip through Battelle, which included the new addition, recently opened.

Walter D. Kramer, chairman, Columbus Chapter, welcomed the 125 members and guests to the meeting, and then turned the duties over to Dr. S. L. Hoyt of Battelle, who was technical chairman for the day.

The first speaker, Howard Scott, is engineer in charge of the metallurgical section, Westinghouse Electric & Mfg. Co. His talk was on "Quenching Media and Related Problems", covering the three types of quenching media—water, oil and air-gas—and two of the important consequences of hardening, namely, distortion and cracking.

L. R. Jackson, metallurgist and physicist at Battelle, described the induction method of hardening the bores of hollow cylinders, as developed by Budd Induction Heating, Inc.

The method is applicable to the bores of automobile hub forgings, cylinders of diesel, gasoline and steam engines, and sleeves in sleeve-valve internal engines. The method has also been successfully applied to cast iron cylinders.

Three Methods of Time Quenching

"Time Quenching" was discussed by J. L. Burns, assistant superintendent, Wire Division, Republic Steel Corp., Chicago. Time quenching has been practiced by some heat treaters for many years but in comparison with ordinary quenching its use is quite limited.

Three methods of time quenching are: *(a)* Simple time quenching, where the part is quenched in water for a given time, then removed and cooled in air; *(b)* double quenching, where a part is quenched in water for a definite period, then transferred to oil quench; *(c)* the interrupted quench, where the part is quenched for a given time in water, removed and exposed to air a definite time, then returned to water quench.

The luncheon was held at Pomerene Hall on the Ohio State University campus—a short walk, on an ideal spring day, from Battelle Institute.

Harder and MacQuigg Speak

Walt Kramer introduced the officers of the three Chapters, and then turned the ceremonies over to genial National Secretary Bill Eisenman, who called on A.S.M. Vice-President O. E. Harder and Dean C. E. MacQuigg of Ohio State's College of Engineering for a few remarks.

The visitors included the chairman of the Golden Gate Chapter, J. G. McCallum, who was in Columbus at the time, Editors Ross of *Steel* and Thum of METAL PROGRESS, and others.

The afternoon session began with a discourse on "Austempering" by Elmer E. Legge, district director of research, American Steel & Wire Co., Worcester, Mass. Comparisons of austempered parts with standard quenched and drawn parts were shown.

Commercial Austempering Described

An outline of the equipment at the speaker's plant for austempering on a commercial basis was clearly illustrated, including the 70,000-lb. salt bath for the time quench, after heating to the hardening temperature.

E. E. Thum, editor of METAL PROGRESS, concluded a completely enjoyable day with his philosophical description of "Why Do Steels Harden?" or, as he put it, "Why Are Steels so Soft?"

The affinity or force to hold atoms together was puzzling to the scientists and philosophers of 2500 years ago and perhaps will remain a mystery to those who remain 2500 years hence.

Sudbury Ores Discussed

(Continued from Page 1)

joins its former mates in the converter; the sodium salt is reclaimed.

Molten blister copper is cast in anode casting machines and anodes are corroded in the 1230 electrolytic tanks. After two weeks deposition electrolytic copper cathodes are ready for sale or conversion in the wire bar department to wire bar billets or slabs.

The total capacity of these tanks for one loading is over 20 million pounds of copper; production 12,000 tons per month.

Most interesting was the treatment of secondary metals, reclaimed from the electrolytic tank slimes after filtering. Silver, gold, the platinum group (including palladium, rhodium, rubidium and iridium), selenium and tellurium are produced and sold.

Recently Developed Alloy Powders Cover Many Compositions

By Walter M. Saunders, Jr.

Rhode Island Chapter—Powder metallurgy in this country has received great impetus within the last ten years, according to R. L. Patterson, vice-president in charge of development and research work for Hardy Metallurgical Co., New York, who was the speaker at the April 3 meeting.

Although platinum wire had been produced by Wollaston about 110 years ago by methods of powder metallurgy, very little other work was done until about 30 years ago when tungsten filament wire was developed, followed by sintered carbide tools.

Today many independent manufacturing companies are conducting a large volume of research and development work. Many patents are being issued and universities are starting courses; interest is increasing by leaps and bounds and there is no predicting where the end will be.

Mr. Patterson laid particular stress on recently developed alloy powders including many compositions of brasses, bronzes, steels, and aluminum alloys. It is all very upsetting to one who likes to think that some things are settled in metallurgy, and suddenly finds nothing is sacred to an exponent of powder metallurgy.

It seems strange that there is relatively little production of articles by powder metallurgy in Rhode Island although many parts are purchased and interest here is high. It was of great value to have Mr. Patterson enlighten us on this subject, and he did a splendid job of explaining the three main divisions of powder metallurgy, namely, production of powders, mixing and molding, and finally sintering or heat treatment.

From Mr. Patterson's detailed account it is necessary to agree with his statement that the field is becoming too broad for one branch of engineering and can only be covered well by at least five types of engineers working together—the chemist, the physicist, the mechanical engineer, the metallurgist and the electrical engineer.

Ralph W. Eaton, traffic manager for the City of Providence, also spoke on "City Traffic Problems". From what he said, it seems possible some day that our out-of-town friends can drive right through this city without getting lost six or seven times. Perhaps it is purposely difficult to drive through Providence quickly, so that the few friends who come this way will stop a while.

Sessions on High Temperature Alloys And Hardenability

Inspection Trip, Dinner and Entertainment Also Feature Inter-Chapter Meeting

More than 150 members and guests of the York, Philadelphia, Lehigh Valley, Pittsburgh, Southern Tier and Penn State Chapters attended the Fourth Biennial Pennsylvania Inter-Chapter Meeting of the A.S.M. at State College, Pa., on Friday and Saturday, May 3 and 4.

Held under the joint auspices of the A.S.M. and the School of Mineral Industries of Pennsylvania State College, the program started with an inspection trip to Titan Metal Works, Bellefonte, Pa., on Friday morning, followed by an afternoon technical session on "High Temperature Alloys".

C. L. Clark and J. J. Kanter were the speakers, with H. J. French and F. B. Foley as co-chairmen, and V. N. Krivobok and N. L. Mochel as discussion leaders.

The Saturday morning technical session had to do with "Hardenability of Steel", and was addressed by M. A. Grossmann and W. E. Jominy. C. H. Herty was chairman of the session, while G. V. Luerssen and Howard Scott led the discussion.

One of the high spots of the program was the informal dinner on Friday evening. With National Secretary W. H. Eisenman as toastmaster, A.S.M. President Gill spoke for the Society, Prof. D. F. McFarland for the School of Mineral Industries, and the chairmen for the various cooperating Chapters. The main speaker was Walther Mathesius, vice-president in charge of operations, U.S. Steel Corp.

Following a brief intermission, the "Wheel-em-in Steel Makers" presented "The Basic Bessemer Blows Again" in cooperation with the Penn State "Flux and Slag" Players and the Gangue from Pittsburgh and Philadelphia. Needless to say, much applause and hilarity greeted this display of talent, arranged by C. W. Heppenstall.

Strain Aging and Critical Grain Growth Are "Bugs" In Rolling of Sheet Steel

By Anthony C. Kowalski

Worcester Chapter—"Pressed Metal Night" was observed on April 16, with R. S. Burns, supervising research engineer, American Rolling Mill Co., who is in charge of development of sheet steel for stamping applications, as the speaker of the evening.

Mr. Burns traced the history of the development of rolling and drawing sheet steel and commented on the great progress which has been made up to the present time.

Two "bugs" which remain to be eliminated are "strain aging" which is responsible for stretcher straining and some breakage, and "critical grain growth" which, when encountered in steel sheets or in stampings, upon intermediate annealing, causes breakage and coarse surface.

As yet the aging phenomenon has not been satisfactorily overcome. The use of killed steel eliminates aging but presents an economic problem because of higher cost.

Critical grain growth in 0.04 to 0.10% carbon steel results from cold working from 7 to about 25% reduction before annealing at temperatures from 1200 to 1600° F. The range for the best properties for drawn sheet steel, according to Mr. Burns, is from 30 to 70% reduction.

Talk by Dushman Follows Open House At Rensselaer Lab

By Constance B. Brodie

Schenectady Chapter — The staff of the metallurgical department of Rensselaer Polytechnic Institute acted as hosts at the meeting on April 16, when an "open house" at Ricketts Laboratory preceded an excellent dinner at the Institute.

The auditorium in Ricketts Laboratory held a near capacity audience to hear Dr. Saul Dushman, assistant director of the General Electric Research Laboratory and one of the country's outstanding physicists, discuss some of the newer concepts of physics as they relate to metals.

Dr. Dushman's excellently planned and delivered lecture was presented in a manner that gave the assembled metallurgists a comprehensive bird's-eye view of, for instance, what the electron theory of metals is about and how well it applies to metals. In the hands of competent physicists such tools as the Schrödinger Equation can be used to calculate several of the physical constants of some of our metals with extremely close agreement to observed experimental values.

As Dr. Dushman points out, these concrete examples of what has been recently accomplished directly indicate that in the future the greatest advances in metallurgy and applications of the works of the physicist must lie in the closer co-operation of the two—for the betterment of both.

A very active discussion period at the close of Dr. Dushman's formal presentation was not only a compliment to his able presentation but also to the metallurgical interest and timeliness of his topic.

Raw Material, Recovery and Cost Vital Factors in Strategic Mineral Problems

By Thomas E. Hamill

Washington Chapter — Dr. D. F. Hewett of the Geological Survey, Department of Interior, spoke on "Domestic Resources of Strategic Minerals" at the meeting on March 11.

Dr. Hewett explained that in order to understand the problem of strategic minerals the following factors must be considered: *(a)* Raw material in the ground, *(b)* recovery from the ground, or refining of impure metals, and *(c)* cost of producing the metals.

As determined by the Army and Navy Munitions Board in January 1940, strategic metals are antimony, chromium, manganese, mercury, nickel, tin and tungsten. Aluminum has recently been dropped from the list.

Enormous amounts of these metals are needed. For instance, the United States consumes 50% of the world's supply of antimony, but produces only 10% of its needs; consumes 40% of the world's supply of chromium and produces 1%. This country uses 40% of the world output of both nickel and tin, but produces, respectively, only 0.5% and 0.2% of its needs.

Domestic production fluctuates considerably since it depends on the price of the metal. For example, at the present price of 12¢ per lb. for antimony only 1500 tons per year are produced; if the demand should increase the price to 20¢ per lb. it is estimated 3500 tons per year would be produced.

Similarly, if the price of manganese should rise to $35 per ton we would probably produce 15 to 20% of our needs instead of 5 to 7%, and if the price of tungsten should rise to $25 per ton we would probably be self-sufficient in two years.

The kind and distribution of the deposits (veins, lodes, placer, etc.) of each of these strategic minerals found in the United States was discussed. Many deposits have little value since they contain either too small an amount of the strategic metal or are in such form that their extraction is unprofitable.

It was brought out in the discussion that there is some hope of obtaining tin, chromium and nickel from Alaska.

Send Names of New Officers

Chapter secretaries are urged to send in to the National Office the names of newly elected officers of their Chapters so that the records in Cleveland can be brought up to date promptly. Names of the new Chapter officers will be published in the August issue of THE REVIEW.

Friction Is Subject of M.I.T. Conference

Friction, which causes wear and inefficiency in machinery involving enormous economic losses, will be the subject of an intensive conference of scientists, engineers, and research leaders at Massachusetts Institute of Technology on June 5, 6, and 7.

"Friction and Surface Finish" is the specific subject for the conference, with Jerome C. Hunsaker, head of the departments of mechanical engineering and aeronautical engineering at the Institute as chairman of the committee in charge of the conference.

At the morning session on June 5 A. F. Underwood of the General Motors Research Laboratories will deliver a paper on "Some General Aspects of Rubbing Surfaces". This paper will be followed by "Metallurgy of Surface Finish", by Prof. John Wulff of the Institute, and "Preparation of Smooth Surfaces", by D. A. Wallace of Chrysler Corp.

A discussion period in the afternoon will be opened by Leonard Hobbs, of Pratt and Whitney Aircraft.

The morning session of June 6 will hear the following papers: "Description and Observation of Metal Surfaces", by Stewart Way of Westinghouse Research Laboratories; "Surface Friction of Clean Metals", by Hans Ernst, Cincinnati Milling Machine Co.; and "Boundary Lubrication", by G. B. Karelitz of Columbia University. Discussion in the afternoon will be opened by Arthur Nutt of the Wright Aeronautical Corp.

On the third day the papers to be delivered are "On the Mechanism of Boundary Lubrication", by Otto Beeck, Shell Development Co.; "The Effects of Lubricants on Wear of Metals Under Conditions of Boundary Lubrication", by J. C. Geniesse and R. Simard, Atlantic Refining Co.; and "Some Features of Laboratory Wear and Friction Testing", by R. W. Dayton, Battelle Memorial Institute.

The closing paper of the conference, title unannounced, will be delivered by A. R. Stevenson of General Electric Co. Discussion on the third day will be opened by L. M. Tichvinsky of the Westinghouse Research Laboratories.

The committee in charge of the conference includes, in addition to Prof. Hunsaker, Professors John M. Lessells, Robert S. Williams, and John Wulff.

National Metal Congress & Exposition
Cleveland, Oct. 21 to 25, 1940

Diagnosis and Evaluation of Tests Stressed

Speaking on Metallurgical Inspection, Roy Allen Emphasizes Evaluation of Test Data

By Charles A. Nagler

North West Chapter was fortunate in having Roy D. Allen of the Republic Steel Corp., Chicago, as a speaker at the April 17th meeting. His subject was "Metallurgical Inspection".

In any type of metallurgical investigation our success depends upon our ability to diagnose properly the nature and probable source of the trouble. Like any scientific investigation we must depend upon suitable scientific testing equipment for disclosing the necessary information which cannot be obtained from visual observation or from simple destructive tests.

Test data are of little use unless they are properly evaluated. In fact, faulty test data may be even worse than none at all, causing undue loss of the investigator's time and energy and often being responsible for the most serious complications.

The application, maintenance, and operation of testing equipment, whether in the laboratory or in the shop, should be such as to gain and retain the confidence of the operators and all others concerned. If the operators doubt the accuracy of the testing equipment they will very likely ignore for a while the first symptoms of serious trouble.

Operating Hardness Testers

Many of our manufacturing troubles originate from our failure to apply properly, maintain and operate even our most simple testing equipment such as the various hardness testers.

There are three types of Brinell machines in use today — hand operated, power driven and direct reading. In the hand-operated machine, failure to recognize the effect of impulse loading has been a source of constant error in the readings with subsequent adverse effects upon the machinability and properties of the parts tested.

The power-driven machines eliminate impulse loading and are displacing the hand-operated machines both in the laboratories and in production.

Failure to remove decarburized surface usually results in low hardness determinations. Care must also be taken in grinding for hardness tests because in addition to the removal of the decarburized surface we must also avoid overheating.

Republic Procedure Outlined

In the Rockwell and Scleroscope tests it is not only necessary to have the surface to be tested properly prepared, but also proper alignment and rigidity are absolutely essential. The Rockwell and Scleroscope are better suited for parts possessing high hardness, and the Brinell is more reliable on parts which are quenched and drawn back to as low as spring temper.

Mr. Allen then outlined the procedure that is followed at the Chicago plant of the Republic Steel Corp. in filling a steel order (special requirement). The outline covered each step from the time the order is received until the steel is delivered.

To stress the importance of metallurgical inspection Mr. Allen enumerated several experiences he has had in the field and showed the need for competent metallurgical inspection in the steel and allied industries.

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His book contains material presented in three lectures before the Chicago chapter of the American Society for Metals. It gives a clear understanding of the U.S. Patent System . . . the history of monopolies on inventions . . . abuses and administration of the system . . . plus general legal advice on the filing of patents.

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Mehl Clarifies Complexities of Age Hardening

Bases Explanation on Validity of Merica's Original Simple Precipitation Theory

By Fred P. Peters

New Jersey Chapter—Described by Chapter Chairman E. S. Davenport as an explanation of the reasons "some metals, like our arteries, harden as they grow older", the lecture presented at the April 15th meeting was at the same time a shining example of good teaching—a crystal-clear, simple exposition of a complex subject—by a distinguished teacher.

The complex topic was "Age Hardening", and the clarifying speaker Prof. Robert F. Mehl, head of the Department of Metallurgy at Carnegie Institute of Technology, and director of that Institute's Metals Research Laboratory.

About 150 members and guests heard and watched him coolly assemble atoms, shuffle them around, build lattices and then destroy them, and alternately take particles out of solution and put them back again.

Age Hardening Alloys Came Slowly

Although no apology was required for discussing "theory", Dr. Mehl recalled that from the time of Wilm's discovery of Dural in 1911 to the publication of Merica, Waltenberg and Scott's theory of age hardening in 1919, no age hardening alloys of value were developed. Since then, however, hundreds have been discovered or developed—a complete demonstration of the vital importance of sound theoretical explanation.

Dr. Mehl's explanation of age hardening is based fundamentally on the validity of Merica's original simple precipitation theory, with some elaboration. It is not necessary, he believes, to postulate pre-precipitation reactions of a separate nature to account for some of the phenomena that accompany the early stages of age hardening.

His theory runs something like this: All age hardening systems are characterized by the presence of a solute phase the solubility of which decreases with falling temperature. An aggregation of atoms in solution will appear as a precipitated particle, or nucleus, if it corresponds to the formula of the precipitate phase and if it is greater than a certain critical size. This critical size increases with rising temperature and decreases with concentration of the solute.

X-Ray Evidence May Be Negative

Merica's simple precipitation theory has often been attacked because of the frequent failure of careful workers to observe *by X-ray diffraction* any change in lattice parameter during the earliest stages of measurable hardening. Nevertheless, a precipitate of extreme fineness can be seen *under the microscope* in many instances where X-ray evidence is negative.

Evidently the microscope can often detect an ultra-fine precipitate when X-ray analysis is unable to show any change in the solution lattice.

Dr. Mehl, correlating evidence accumulated by various investigators, and with full consideration of the arguments of the proponents of the "knot" and other theories, believes the first stage in continuous hardening to be the formation of "Guinier-Preston zones" (plate-like sections related in orientation to the solid solution matrix), which really represent the first movements of atoms that are ultimately to comprise the equilibrium precipitate.

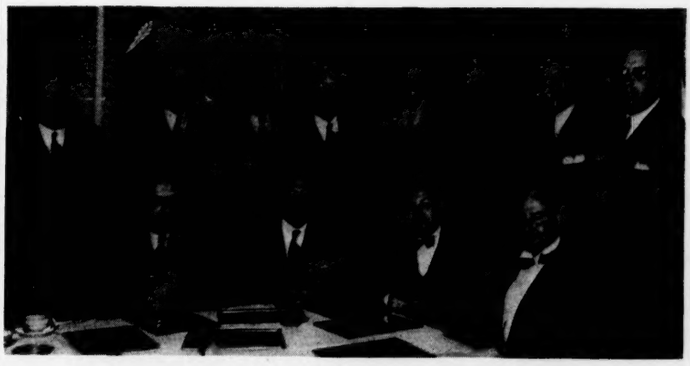
The second stage is the formation of an unstable transition lattice (Θ'), from which the third stage, or equilibrium precipitation, is evolved.

Dr. Mehl also correlated observations on the development of Widmanstätten structures generally with evidence for the plate-like beginning of precipitation hardening of the continuous type.

But lest we give a false impression, there are several things of which he voluntarily declared ignorance—for example, the explanation for the difference between the two types (continuous and discontinuous) of age hardening; and the reason some systems show a considerable drop in solubility with falling temperature, yet the corresponding hardness increase is only slight.

Which (because *we* don't know, either) did wonders for what was left of our ego!

Los Angeles Past Chairmen Are Honored



Past Chairmen of Los Angeles Chapter Receive Engrossed Certificates in Recognition of Their Services. Standing (left to right): E. C. Bain, past president A.S.M.; Past Chairmen J. H. Spade, W. H. Laury, C. A. Stiles, T. S. Hutton, R. S. Smith, Wm. A. DeRidder, and George Stetter. Seated: John Disario, James H. Knapp, D. S. Clark, and Toastmaster Wm. Farrar.

(Right) Dr. Bain and Chairman Knapp Serenaded by Swiss Alpine Yodelers.

(Below) Benjamin H. Brown Leads Songs on the Request Program and Dr. Bain Later Does a Blackboard Demonstration During His Lecture Course on Functions of the Alloying Elements Presented in Los Angeles in March.

Past President Bain Also Attends, Gives Alloy Course

By John E. Wilson

Los Angeles Chapter — Honored guest at "Past Chairmen's Night" held March 18 at Scully's Cafe, was Edgar C. Bain, assistant to the president, U.S. Steel Corp., and past president of the A.S.M.

Credit for the growth and development of the Chapter from its founding in 1923 to a membership of over 225 was given to the men who served as chairmen in the past: R. B. Dunsmore, W. H. Laury, C. A. Stiles, W. Hampton, J. H. Spade, W. A. DeRidder, T. S. Hutton, E. H. Kottnauer, R. S. Smith, C. E. Burt, D. S. Clark, John Disario, and George Stetter.

Only three chairmen were unable to be present to receive the engrossed certificates which had been prepared for them. During the meeting William Farrar, one of the charter members, acted as toastmaster, and a very enjoyable evening was had.

During the meeting it was announced that Dr. Bain would present his famous series of educational lectures on "Functions of the Alloying Elements in Steel" on March 19 to 22. Over 140 persons attended each of the four lectures, and it was generally agreed that Dr. Bain's contributions to the metal industry are invaluable.

Cincinnati Meeting Features Air Travel

By Kurt Siems

Cincinnati Chapter—On one of the worst days of the early spring, in a pouring rain which later turned to snow, one of the largest crowds of the year showed up for the April meeting.

Reasons for this large turn-out were manifold:

1. The ladies had been invited.
2. The meeting was held in the Administration Building of the Municipal Airport.
3. The entertainment part of the program was entirely arranged by the Cincinnati District office of the American Airlines under the personal supervision of the district manager, H. J. Lyall.
4. Officers for the 1940-1941 season were elected.

Activities started promptly at 6:30 p.m. with a chicken dinner identical to those delicious meals furnished complimentary by the American Airlines on their flights.

Mr. Lyall then delivered an interesting talk on qualifications and training of air-transport pilots and Captain Elkin Floyd was on hand to answer questions and explain some of the technical details of operating and landing a ship.

A well-planned, highly educational and splendidly photographed sound film entitled "Flagships of the Air" was then shown depicting principally details and views of a regular flight on a Chicago-New York through trip.

The only business transacted was the election of the new officers for the forthcoming season. Their names will be published in a later issue.

Fundamentals Behind Tool Failure Traced

70% of Failures Due to Lack of Attention to Analysis, Heat Treatment or Design

By G. G. Wilcox

Hartford Chapter—The April meeting was held on Tuesday the 9th, the usual dinner at the City Club preceding the meeting proper. The subject of the evening was "Trouble Shooting on Tool Steel", ably discussed by G. E. Brumbach of the Carpenter Steel Co.

Opening his lecture with the statement that, in his experience, 70% of tool failures are due to lack of attention to the fundamentals of analysis, heat treatment or design, Mr. Brumbach largely confined his lecture to a discussion of these fundamentals.

Two Classes of Stresses

Stresses in tools are of two classifications. First must be considered the actual stresses imposed by the nature of the work required of a tool. Secondly, allowance must be made for the internal trapped stresses chiefly due to the heat treatment performed on the tool. Because of these internal stresses, probably not over 50% of the theoretical strength of a tool is available for work.

Chemical analysis is of prime importance and must depend on the type of work a tool is to do, making allowance for the desired hardness, wear resistance, toughness, hardening accuracy, and red-hardness.

Assuming that the proper analysis has been selected, of equal importance are quality, purity, and uniformity as revealed by disk inspection, grain size, and hardenability.

The design must be such that the tool will not only perform satisfactorily in service, but permit as much ease of heat treatment as possible.

Stamp Marks Cause Cracks

A machinist can easily destroy a tool by leaving the metal in a strained condition from too heavy cuts. Many tools fail by cracking in heat treatment or service because of stamp marks placed in vital locations. Proper fillets and balanced sections are also important.

The hardener must realize that when a tool has both light and heavy sections, the light sections and the surface of the heavy sections will pass the critical range ahead of the rest of the tool, so that some parts are contracting while others are expanding. Heating must be governed accordingly.

Common causes of cracking are insufficient soaking and quenching from within the critical range.

Tools with soft spots are prone to crack in grinding or in service. When grinding, it must be appreciated by the operator that alternate expansion and contraction takes place as the wheel travels over the surface, setting up a highly stressed condition.

In discussing heat treating atmospheres, the speaker brought out the point that a stagnant condition near any part of the tool might cause a bad surface condition, so that for best results, a good and complete circulation of atmosphere is very desirable. This applies particularly to high speed steel, but to tool steels as well.

The lecture was illustrated by many slides showing tool failures and the causes of these failures were explained. Mr. Brumbach was congratulated and thanked for his precise and useful discussion of his subject.

Helpful Literature — Mail Coupon Below

Tool Care

A new catalog on Kennametal tools for machining steel and other metals is valuable to anyone interested in better machining results. McKenna Metals Co. Bulletin Ed-238.

Metal Welding

Of particular interest to the aircraft industry and all fabricators of light-gauge metal will be the new booklet "Sheet Metal Welding Fundamentals" released by the Linde Air Products Co. Bulletin Ed-63.

Carburizing Furnace

The new Homocarb Furnace which gives a carburized case of unusual speed and certainty is described in a new booklet by Leeds & Northrup Co. Bulletin Ed-46.

Welding Stainless Steels

A 24-page technical bulletin, giving important information for the engineer, designer or welding operator on the welding of stainless steel, is available through the Arcos Corp. Bulletin Hc-191.

Tool Steel Chart

A valuable Tool Steel Guide Chart for Shop Use is offered by William Jessop & Sons, Inc., makers of tool steels of every description. Bulletin Ed-61.

Oil Burners

A new model proportioning oil burner giving accurate combustion and temperature control with greater fuel economy is described in a booklet by the Hauck Manufacturing Co. Bulletin Ed-181.

Heat Fans

A complete line of fans for high temperatures are illustrated and accompanied by detailed specifications in the colorful booklet available through the Garden City Fan Co. Bulletin Ed-261.

Portable Electric Furnace

A unique portable electric furnace designed for use at temperatures below 1100° F. with drawing salts and oil tempering baths is described in a booklet by Claud S. Gordon Co. Bulletin Ed-53.

Aluminum Finishes

A new booklet which lists the finishes available for various forms of Alcoa Aluminum Alloys has just been released from the press by the Aluminum Company of America. Bulletin Ed-54.

Steel Castings

Steel castings made under laboratory control are described in a folder just released by the Dodge Steel Co. Bulletin Ed-263.

Indirect Air Heater

A new indirect air heater which many combustion engineers claim as the most important development in 20 years is described in a folder by the Despatch Oven Co. Bulletin Ed-123.

Case Histories

Factual and practical data plus four "case histories" of REXALLOY'S superior cutting performance is contained in literature just made available by the Crucible Steel Company of America. Bulletin Ed-56.

Conjecto-Firing

A wider temperature range and closer control, known as Conjecto-Firing, is now available in Surface Combustion furnaces. A four-page leaflet describes the advantages of this system. Bulletin Ed-51.

Salt Bath Furnace

"As modern as radio-beam control" says the attractive folder put out by Commerce Pattern Foundry & Machine Co. about the Upton electric salt bath furnace. A brief but informative article on "The Importance of Temperature" by R. C. Upton is included. Bulletin Ed-266.

Industrial Furnaces

A series of interesting bulletins showing Dempsey Industrial Furnaces in a wide range of requirements is now available through the Dempsey Industrial Furnace Corp. Bulletin Dd-260.

Casting Practice

The Detroit Steel Casting Co. has a pictorial presentation of the casting process in their plant which should be of interest to manufacturers interested in quality steel castings. Bulletin Ed-262.

Metallographic Equipment

The 100-page "Metal Analyst" issued by Adolph I. Buehler features new Metallographic Sample Preparation Equipment; a comparative listing of Metal Microscopes, Measuring Microscopes, and Spectrographs; an index of over 1000 new technical books and papers; and a treatise on the Application of Reflected Light. Bulletin Ed-135.

Strain Gages

A description of strain gages and extensometers handled by Baldwin-Southwark is included in an attractive bulletin just issued. Bulletin Ed-67.

Tuf-Wear Steel

A neat little 24-page booklet describing special alloy steels which have been developed for the oil and other industries is available through the Oklahoma Steel Castings Co. Bulletin Ed-257.

Temperature Control

The new G-E Reactrol system of exact temperature control is explained in a new bulletin made available by General Electric Co. Bulletin Ed-60.

Clean Hardening

Continuous clean hardening machines for work ranging from extremely small, light springs, stampings, drop forgings, etc., up to quite large and heavy pieces are described in a bulletin by the American Gas Furnace Co. Bulletin Ed-11.

Degreaser

Degreasing machines for practically every cleaning job are described in literature made available through the Detroit Rex Products Company. Bulletin Hc-111.

Brazing Furnace

If you have a brazing problem you will be interested in the worth-while folder issued by Hoskins Mfg. Co. Bulletin Ec-24.

Vanadium Steel

Latrobe Electrite Vanadium High Speed Tool Steel is described in literature released by the Latrobe Electric Steel Co. Bulletin Kb-208.

Industrial Furnaces

Furnaces of all types are fully described in technical bulletins made available by the Eclipse Fuel Engineering Co. Bulletin Ec-226.

Cutting Oils

An interesting new booklet "Metal Cutting Lubrication—In Theory and Practice" has just been made available by Cities Service Oil Co. Bulletin Ec-113.

Lectrodryer

A machine designed specifically for the dehumidification of air and other gases as well as certain liquids—the "Lectrodryer"—is pictured and explained in a booklet by the Pittsburgh Electrodryer Corp. Bulletin Gc-187.

Ferrocarbo

A cupola addition, "Ferrocarbo", which improves casting quality, lowers costs and reduces rejects is described in literature available through the Carborundum Co. Bulletin Bd-57.

Ferro-Alloys

An interesting folder by Electro Metallurgical Co. tells all about their ferro-alloys and their special service to users which will help them to operate their furnaces and make alloy additions under the proper conditions. Bulletin Jy-16.

Moisture Determination

A very colorful leaflet by the Harry W. Dietert Co. describes new, rapid methods of determining moisture content by drying. Illustrated. Bulletin Cd-198.

Precision Saws

The complete selection of DOALL precision saws supplied by Continental Machines, Inc., is shown in an attractive folder supplied by this company. Bulletin Ed-170.

Process Control

"Stabilflo Valves", an illustrated folder just issued by The Foxboro Co., describes this rugged, yet extremely accurate, valve for use in process control. Bulletin Ed-21.

Foundry Sand

A pamphlet recently issued on TAM Foundry Zircon Sand and TAM Zircon Flour contains detailed information on these products of the Titanium Alloy Mfg. Co. Bulletin Hc-90.

Moly In Steel

Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the excellent book on molybdenum steels published by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Metcolizing

Actual photomicrographs illustrate the action of high heat corrosion on a Metcolized surface in the bulletin by Metallizing Engineering Co., Inc., describing this new and efficient method of applying a coating of aluminum to iron or steel. Bulletin Ed-267.

New X-Ray Unit

A new X-ray diffraction unit, smaller and more versatile than previously available outfits of this type, is described in a comprehensive folder released by the General Electric X-Ray Corp. Bulletin Hc-6.

Furnace Alloys

Standard Alloy Co. emphasizes the necessity, brought about by the use of high temperatures in heat treating, for an alloy that will do its particular job at the lowest cost. An attractive booklet, illustrating and describing various types of alloy casting for heat and corrosion resistance. Bulletin Ad-151.

Hot Pressed Parts

Hot Pressed Parts and Pressure Die Castings made with substantial savings over other methods are described in an 8-page booklet released by the American Brass Company. Bulletin Cc-89.

Processing Materials

A complete line of processing materials, including pack carburizers, reheating salts, quenching oils, drawing salts, cutting oils, etc., is described in an attractive folder by G. S. Rogers & Co. Bulletin Ed-265.

Machinery Steel Selector

A handy chart giving complete physical characteristics with variations up to 8" cross-sections, machining data, etc., on the ELASTUF group of Related Machinery Steels is available through Horace T. Potts Co., Brown-Wales Co., and Beal McCarthy & Rogers. Bulletin Ed-264.

Rotoblast

Several unusual features make the Pangborn Rotoblast of more than ordinary interest to manufacturers with a metal cleaning problem. Described in booklet by the Pangborn Corp. Bulletin Ed-68.

Electric Furnaces

Holcroft & Co. have a 30-page booklet which tells the story of a score of representative furnace installations, giving production records, operating data and furnace description. Bulletin Kb-203.

Electric Salt Bath Furnaces

Users' reports on work treated in the Ajax-Hultgren salt bath furnace are described and operating data for cyaniding, carburizing, hardening high speed steel, etc., are given in literature of Ajax Electric Co., Inc. Bulletin Cd-43.

Microscope Accessories

A 62-page catalog with index and price list describes and illustrates all sorts of microscope accessories, including a wide variety of objectives and eye pieces, made by Bausch & Lomb Co. Bulletin Sx-35.

Non-Sparking Safety Tools

If your work is near inflammable gases, explosives, etc., the new 20-page catalog featuring Ampco non-sparking safety tools will prove interesting and valuable. Ampco Metal, Inc. Bulletin Bd-175.

Heat-Corrosion Resisting

A handsome new 56-page book on electrical heat and corrosion resisting alloys containing general information and useful data about such alloys has just been published by the Driver-Harris Co. Bulletin Cd-19.

High-Strength Steel Data

Complete mechanical property data on Ductiloy, a new low-alloy, high-strength steel, are given for strip, plate and bars in a folder of Great Lakes Steel Corp. Bulletin Ec-229.

Free Machining Steels

Speed Case and Speed Treat, two steels with increased machining properties, are described in literature available through Monarch Steel Co. Bulletin Cd-255.

High Speed Steel

Required hardness and extraordinary toughness combine to make Firth-Sterling Co. new high speed steel "Mo-Chip" of unusual interest to manufacturers who need a steel that is "practically indestructible." Bulletin Ad-177.

Heat Treating Hints

A helpful, colorful booklet edited by experienced heat treaters is available through the Lindberg Engineering Co. Bulletin Bd-66.

Houghton Products

An attractive booklet summarizing the leading products which E. F. Houghton & Co. is supplying in volume to the metal industries of the world is now available. Bulletin Cd-38.

Die Steels

An interesting 12-page booklet, well illustrated with pictures and graphs, gives uses of die steels manufactured by the Jessop Steel Co. Bulletin Ed-173.

Metallographic Equipment

The large and complete line of equipment for the laboratory made by the Fisher Scientific Co. is described in a clever leaflet just released. Bulletin Cc-182.

Hardening Furnace

A new pamphlet which describes "Certain Curtain" furnaces made by C. I. Hayes, Inc., will be particularly interesting to those with hardening problems. Bulletin Nc-15.

Tool Steels

Matched tool steels are explained in a 60-page manual which is proving most helpful to tool steel users. Supplied by Carpenter Steel Co. Bulletin Lc-12.

Carburizer

Modern is the furnace and modern is the catalog which describes it. Hevi Duty Electric Co. has an exceptionally well-written, well-illustrated, and artistically printed booklet on the Hevi Duty carburizer which uses the Carbonol process. Bulletin La-44.

Bessemer Steel

Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. Bulletin Ca-50.

Laboratory Furnace

The Sentry Co. describes a high temperature tube combustion furnace. It permits operating temperatures up to 2500° F., thus offering greater speed and precision for combustion analysis or other laboratory procedures. Bulletin My-114.

Pot Furnaces

Cylindrical type Pot Furnaces for Lead, Salt, and Cyanide baths are illustrated and described in a leaflet issued by the American Electric Furnace Company. These furnaces are adapted for practically any heat treating operations using a liquid medium. Bulletin Kb-2.

New Pot Furnace

Thirty per cent recuperation of fuel is one of the features of the new type pot furnace developed by A. F. Holden Co. which features unusual fuel economy and efficiency. Bulletin Ed-55.

Electric Furnaces

A four-page bulletin on ⅛ lb. to 4 lb. high frequency melting furnaces and 3 kw. converter is now available through the Ajax Electrothermic Corp. Bulletin Dd-41.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Seamless Tubes

Prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels" which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Combustion Safeguard

The Flame-otrol, a combustion safety device designed to shut off fuel and prevent explosions in case of flame failure, is described in a 12-page booklet by Wheelco Instruments Co. Bulletin Cd-110.

Meehanite Wheel Chart

A handy wheel chart which contains complete engineering data about all the various types of Meehanite castings available to industry has been prepared by the Meehanite Research Institute of America. It quickly reveals the physical properties of general engineering castings as well as heat, corrosion and wear resisting types. Bulletin Dd-165.

Ramix

Ramix is a prepared magnesite refractory made by Basic Dolomite, Inc. An interesting folder gives full information on its uses in basic open-hearth and basic electric furnaces, and in various non-ferrous furnaces, along with complete instructions for installing. Bulletin Dd-192.

Tocco Junior

A new induction hardening machine for hardening small parts is described in a new bulletin released by the Ohio Crankshaft Co. Bulletin Dd-145.

Measuring Metal Coatings

Measurements of local thicknesses of coatings on metals may be made in less than one minute by the Magne-Gage, an interesting instrument described in a 4-page folder by the American Instrument Co. Bulletin Cd-259.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, the latest edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is available. Bulletin Bb-124.

Oil Burners

North American Mfg. Co. offers a bulletin describing improved low pressure oil burners, one type especially designed for automatic control and ideally suited for use with proportioning control valves. Bulletin Na-138.

The Review
7301 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. (Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.)

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				Ed-264	Bd-66	Ed-55	Na-138

Trend to Decrease Number of Aircraft Engine Steels Shown

S.A.E. 4600 and X4300 Are the Types Most Used

By Paul P. Johnson

Cleveland Chapter—About 400 members turned out to hear Henry J. Fischbeck, chief metallurgist at Pratt and Whitney Aircraft, on the night of April 1.

His talk, "Materials in Aircraft Engines", has been given before several other Chapters, and the report of it must necessarily be brief.

Most significant was the trend of the aircraft engine industry to decrease the number of different ferrous materials used and standardize on a few. Wherever possible, the S.A.E. 4600 and X4300 series are used, the latter in heavier sections where greater hardenability is needed.

These two types have not, of course, supplanted other ferrous materials entirely, but they do show such a satisfactory combination of machinability, hardenability, and absence of a brittle range that their use is becoming very widespread.

Exact figures showing how the weight per horsepower in the internal combustion engine has dropped from 25 lb. in 1900 to less than 1½ lb. today made a striking illustration of how design and improved quality have brought the aircraft engine to its present state.

Commenting on the question of choosing between ferrous and non-ferrous materials, Mr. Fischbeck pointed out that as steel is heat treated to a strength of 160,000 psi. its strength-weight ratio exceeds that of aluminum alloys. Since steel has a better defined endurance limit than aluminum, its advantages are pronounced in the above strength range.

Twenty past chairmen were dinner guests of the Chapter and were presented with certificates framed in stainless steel.

Officers were also elected at this meeting, and will be published in a later issue. Lewis F. Herron of the James H. Herron Co. is the new chairman for the 1940-41 season.

Talks on Bearing Metals

By John C. Conte

Penn State Chapter—On March 5, Dr. C. E. Swartz of the Cleveland Graphite Bronze Co. addressed the Chapter on "Bearing Metals".

Dr. Swartz first differentiated between bearings and bushings, then showed slides depicting the manufacture of bearings from strip. He named alloys employed commercially for this purpose, stating that tin-base babbitt is by far the most widely used—others being the lead-base antifriction, copper-lead, cadmium-nickel, and cadmium-silver.

The speaker concluded his lecture with a discussion of bearing failures, then cleared up doubtful points in the minds of his listeners in a session devoted to answering their questions.

Uddeholm Adds SKF Tool Steels

On May 1 the Uddeholm Co. of America, Inc., took over the warehouse tool steel business formerly handled by SKF Steels, Inc.

Rapidly growing business in their other lines of steel products necessitated the move, according to SKF.

The Uddeholm Co. is American representative for the Uddeholm Co. of Sweden, which has been making steel for over 270 years.

HERE AND THERE WITH A.S.M. MEMBERS

NORMAN L. DEUBLE is now associated with the Copperweld Steel Co. at Warren, Ohio, in the capacity of assistant to vice-president.

N. L. Deuble

Mr. Deuble is a graduate of Case School of Applied Science with the degrees of B.S. and Metallurgical Engineer. In 1920 he started working in the engineering department of the United Furnace Co., now a part of Republic Steel Corp. In 1921 he went with United Alloy Steel Corp. in the metallurgical laboratory, and then spent about eight years doing metallurgical road service for United Alloy and for Central Alloy Steel Corp. Since 1930 he has been in the metallurgical office of the Central Alloy Division of Republic Steel Corp.

He is a member of the A.S.M. and of the Iron and Steel Committee of the Society of Automotive Engineers.

* * *

THANKS to the generosity of FREDERICK G. HUGHES, general manager of New Departure Division of General Motors Corp. and past president A.S.M., the little village school in West Cornwall, Conn., where he learned his ABC's will become a public library.

Mr. Hughes's gift of $1000 for the purchase of the structure will mean the preservation of a century-old town landmark and the retention by the town of at least one old school, Cornwall now having a consolidated grammar school which will open in September. The new library, much needed by the town, since the rapidly growing collection of books is now maintained in the firehouse, will be dedicated as a memorial to Mr. Hughes's parents, George and Mary Volmiller Hughes.

* * *

HENRY J. FISCHBECK, chief metallurgist for Pratt & Whitney Air-Craft during the past 10 years, has recently been promoted to the position of process engineer.

H. J. Fischbeck

In his new position, Mr. Fischbeck will keep in close contact with all manufacturing and engineering departments and will have the important duty of maintaining control of the processes involved in the manufacture of Pratt & Whitney aircraft engines.

A specialist in the field of metallurgy for 25 years, Mr. Fischbeck has also had wide experience in the applications of metallurgy to aircraft. His first experience along this line was in 1916 with the Simplex Automobile Co., which at the time was manufacturing Hispano-Suiza aircraft engines.

Subsequently he was employed by the Wright-Martin Co., the Wright Aeronautical Corp., and the Pratt & Whitney Tool Co. In 1929, Mr. Fischbeck joined Pratt & Whitney Aircraft to organize the metallurgical and heat-treating department.

At present, he is a member of the newly formed Aeronautical Materials Specifications Committee, S.A.E., a member of the Hartford Chapter, A.S.M., the Hartford Engineers Club, and the Metallurgical Advisory Board of the Hartford Ordnance District.

A native of New York City, Mr. Fischbeck received his academic training at the Newark Technical School and the Pratt Institute in Brooklyn, where he specialized in chemistry.

* * *

The Officers of the Newly Formed Southern Chapter of the A.S.M. Are (Top) James T. MacKenzie, Chairman, and John H. Beeler, Vice-Chairman; (Below) Robert S. Crowder, Secretary, and Thomas C. Ford, Treasurer.

F. L. LAQUE, who has been assistant director of technical service on mill products of the development and research division of The International Nickel Company, Inc., is now engaged in development activities on all applications of nickel-containing alloys.

WILLIAM A. MUDGE, formerly works metallurgist of the company's rolling mill at Huntington, West Va., who recently joined the technical service section of the development and research division in New York, has been appointed assistant director of technical service to succeed Mr. LaQue.

Mr. LaQue has been associated with International Nickel since 1927, devoting his activities to the field of corrosion resisting materials. Dr. Mudge joined the company in 1920.

* * *

E. C. BLACK, past secretary-treasurer of the Los Angeles Chapter, died May 1. Two years ago Mr. Black resigned as resident agent for the Midvale Co. and formed a new company known as Tool Steels, Inc. This firm represented the tool steel division of Henry Disston & Sons, Inc., for the states of California and Arizona.

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Mr. Dienner, a member of a Chicago firm of attorneys and counselors in patent law, presented the material in this book before the Chicago Chapter of the A.S.M. Anyone interested in protecting developments in the metal industry will find this book well worth the small price charged for it.
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Over 200 Stainless Steels Now Being Made Says Jerabek

By Charles A. Nagler

North West Chapter — As early as 1821 the acid resistant qualities of iron-chromium alloys had been reported, but it was not until 1914 that the first stainless steels appeared on the market, said Dr. H. S. Jerabek, assistant professor of metallography, University of Minnesota, discussing stainless steels at the April 3 meeting.

At the present time there are more than 200 different stainless steels made commercially, and 42 types of alloys are recognized by the American Iron and Steel Institute.

For the purpose of the discussion, stainless steels were classified according to their response to heat treatment —the martensitic group can be hardened by quenching, the ferritic steels have no critical point and can be hardened only by cold working, while austenitic stainless steels, containing substantial amounts of nickel, are softened by quenching.

Each of these groups of steel was discussed with respect to composition, resistance to corrosion, heat treatment, working properties, and suitability for high temperature service. Emphasis was concentrated on a few commonly used alloys of each group.

The open discussion which followed the talk was centered about special alloys and specific applications which were of particular interest to the members of the Chapter.

An exhibit of stainless steel sheet with the various types of surface finish and a series of products fabricated from stainless steel were displayed by Gladstone Hill of Carnegie-Illinois.

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Harder Honored at Penn State

By John C. Conte

Penn State Chapter on March 12 gave a dinner in honor of Dr. Oscar E. Harder, vice-president of A.S.M. and Fourteenth Annual Priestley Lecturer.

The dinner was held in the Nittany Lion Inn and was attended by a number of invited guests in addition to members of the chapter.

Philadelphia Committee Operates Placement Bureau

Technical Service Committee is the name of an organization operated by the Philadelphia Chapter of the A.S.M. jointly with the local branches of other engineering societies in Philadelphia, as a non-profit placement bureau for technical men.

This is an additional service by the Chapter supplementing the Philadelphia office of the national A.S.M. employment service. Its activities have been very successful over a period of years, 221 technical men having been placed during the past year.

Claude L. Roth is official representative of the A.S.M. on the Committee, which has headquarters at 1317 Spruce St., Philadelphia.

List of A.S.M. Employment Offices

Members of the American Society for Metals who are interested in securing a new position or firms who have a position open should communicate immediately with the nearest employment office. These offices are all members of the Employment Counsellors Association of the U. S., whose Cleveland member, the Technical Placement Service, is national employment headquarters for the Society. These employment offices are maintained to benefit the firm members as well as individual members of the Society, and companies having an opening will find that these offices carry a select list of well-qualified A.S.M. technical men.

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